

$$t_n = a(r)^{n-1}$$

GEOMETRIC SEQUENCES

Geometric Sequence - a sequence where there is a constant ratio between consecutive terms

1st term

multiplicative factor
constant ratio

<u>examples</u>	1) 1, 2, 4, 8, 16, ...	$a = 1$	$r = 2$
	2) 2, 10, 50, 250, ...	$a = 2$	$r = 5$
	3) -3, 6, -12, 24, ...	$a = -3$	$r = -2$

t_n formula for each geometric sequence examples

1) $a = 1$ $r = 2$ $t_n = a(r)^{n-1}$ $t_n = 1(2)^{n-1}$ $t_n = 2^{n-1}$	2) $a = 2$ $r = 5$ $t_n = a(r)^{n-1}$ $t_n = 2(5)^{n-1}$	3) $a = -3$ $r = -2$ $t_n = a(r)^{n-1}$ $t_n = -3(-2)^{n-1}$
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find t_5 and t_9 for each geometric sequence example

1) $t_5 = 2^{(5)-1}$ $t_5 = 2^4$ $t_5 = 16$ $t_9 = 2^{(9)-1}$ $t_9 = 2^8$ $t_9 = 256$	2) $t_5 = 2(5)^{5-1}$ $t_5 = 2(5)^4$ $t_5 = 1250$ $t_9 = 2(5)^{9-1}$ $t_9 = 2(5)^8$ $t_9 = 1250,000$	3) $t_5 = -3(-2)^{5-1}$ $t_5 = -3(-2)^4$ $t_5 = -48$ $t_9 = -3(-2)^{9-1}$ $t_9 = -3(-2)^8$ $t_9 = -768$
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Ex.1 How many terms are in the following sequences

$$(a) -1, -3, -9, -27, \dots, -6561$$

$$-6561 = -1(3)^{n-1}$$

$$6561 = 3^{n-1}$$

$$3^8 = 3^{n-1}$$

$$\therefore 8 = n-1$$

$$n = 9$$

$$tn = 0.5(2)^{n-1}$$

$$(b) 0.5, 1, 2, 4, \dots, 4096$$

$$4096 = 0.5(2)^{n-1}$$

$$8192 = 2^{n-1}$$

$$2^{13} = 2^{n-1}$$

$$\therefore 13 = n-1$$

$$14 = n$$

Ex.2 Given that $t_5 = 1875$ and $t_7 = 46875$, find t_n for the geometric sequence

$$1875 = a(r)^4$$

$$46875 = a(r)^6$$

divide

$$\textcircled{1} \quad 46875 = a(r)^6$$

$$\textcircled{2} \quad 1875 = a(r)^4$$

$$25 = r^2$$

$$\pm 5 = r$$

$$1875 = a(5)^4$$

$$\frac{1875}{625} = a$$

$$3 = a$$

$$tn = 3(5)^{n-1}$$

$$\text{or}$$

$$tn = 3(-5)^{n-1}$$